

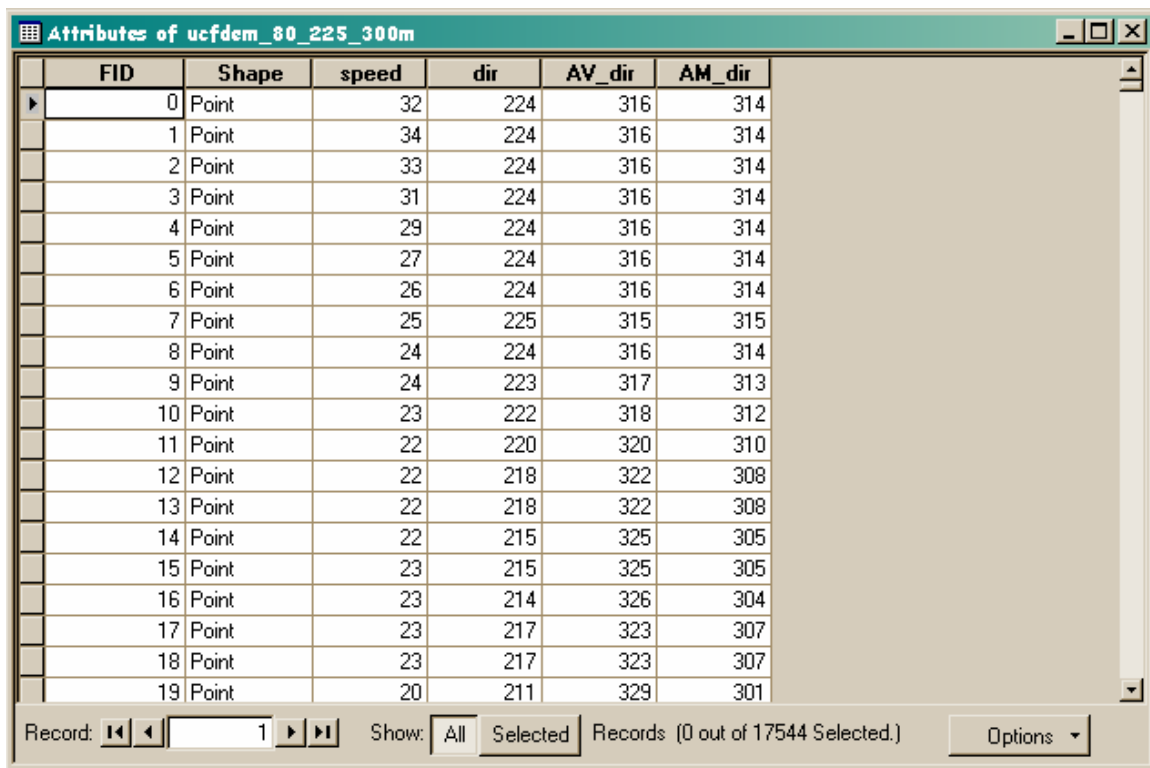
# Displaying and Rotating Wind Wizard Derived Wind Direction and Windspeed Vectors in ArcMap 8.3 June 20, 2005

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## A. Displaying Wind Wizard generated Gridded Wind Direction – Speed vectors.

Data requirements are an ArcMap shapefile format. The shapefile generated during the Wind Wizard process will contain five data fields in the associated .DBF file (Figure 1).

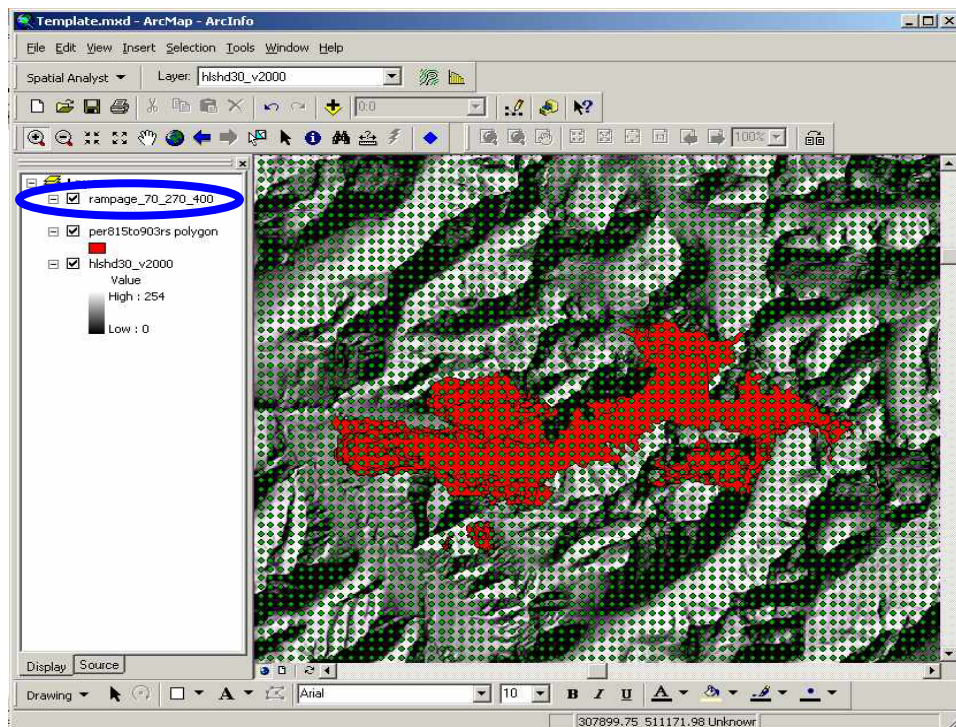


FID	Shape	speed	dir	AV_dir	AM_dir
0	Point	32	224	316	314
1	Point	34	224	316	314
2	Point	33	224	316	314
3	Point	31	224	316	314
4	Point	29	224	316	314
5	Point	27	224	316	314
6	Point	26	224	316	314
7	Point	25	225	315	315
8	Point	24	224	316	314
9	Point	24	223	317	313
10	Point	23	222	318	312
11	Point	22	220	320	310
12	Point	22	218	322	308
13	Point	22	218	322	308
14	Point	22	215	325	305
15	Point	23	215	325	305
16	Point	23	214	326	304
17	Point	23	217	323	307
18	Point	23	217	323	307
19	Point	20	211	329	301

Figure 1. Attribute table for Wind Wizard generated shapefile as displayed in ArcMap.

- FID: Feature ID, a unique number assigned to that point by ArcMap.
- Shape: Point indicates that the feature type for the shapefile is a point.
- speed: Is the Wind Wizard generated windspeed at the 20-foot level in miles per hour (mph).
- dir: Is the Wind Wizard generated azimuth direction the wind is coming from in degrees.
- AV\_dir: Is the Wind Wizard manipulated value required for use in ArcView for display purposes.

- f. AM\_dir: Is the Wind Wizard manipulated value required for use in ArcMap for display purposes.
1. Open ArcMap and load other data coverages and fire perimeter files of interest.
  2. Load the ArcMap Wind Wizard shapefile for the fire of interest. The wind vector grid will appear on the coverage as individual points (Figure 2).



**Figure 2. Example ArcMap project with Wind Wizard generated shapefile as displayed in ArcMap prior to scaling and rotation of the Wind Wizard generated vectors.**

3. After loading the file into the ArcMap project, double click on the layer name in the **Table of Contents** to open the **Layer Properties**. This will open the dialog box in Figure 3.
4. Click on the **Symbology** tab. (Figure 3).

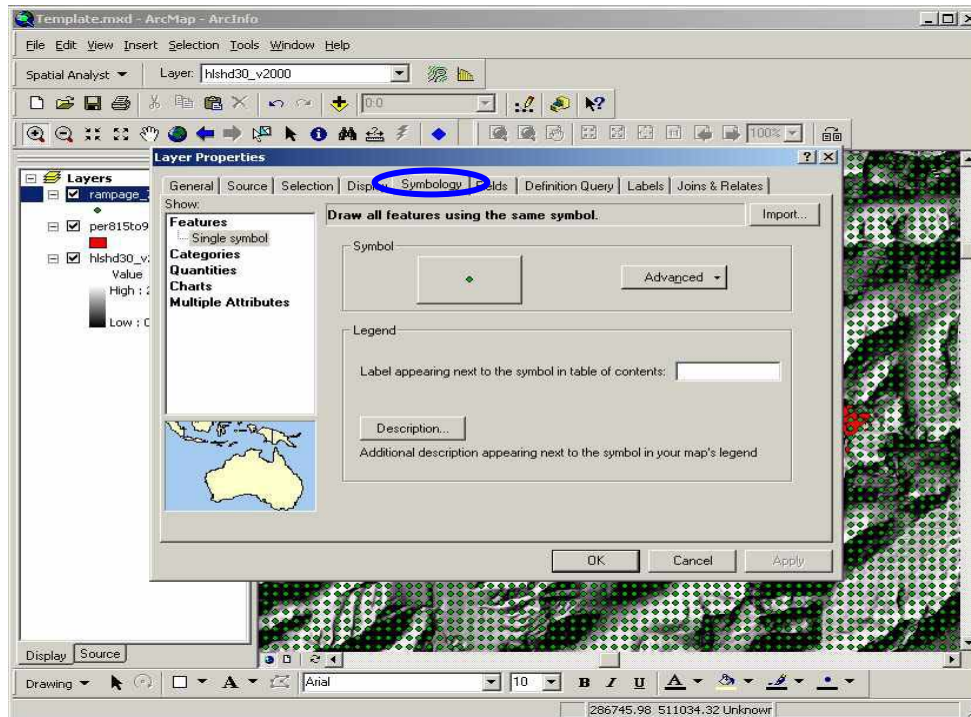


Figure 3. Layer Properties dialog box as displayed in ArcMap.

5. In the **Show** pane on the leftside, select **Quantities** then **Graduated symbols** (Figure 4).

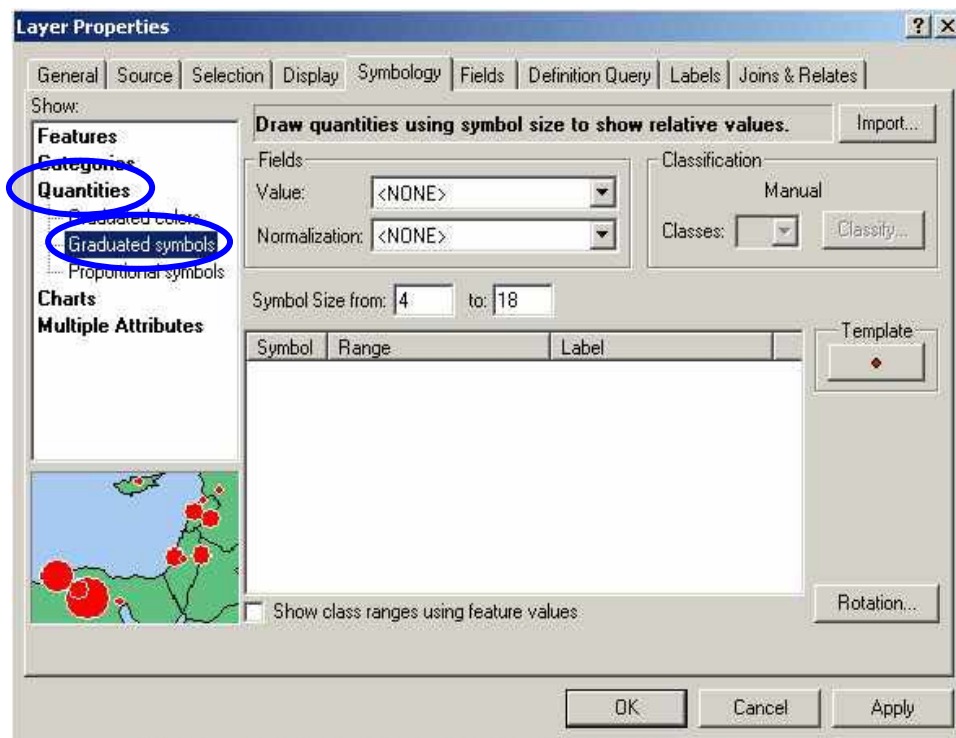


Figure 4. Selecting the Quantities and Graduated symbol.

6. In the **Value** window click on the dropdown arrow and select **speed** from the available options. The following **Warning Message** (Figure 5) will appear depending on the number of records in the associated shapefile. Click on the **OK** button and the **Warning Message** will disappear. See Appendix A on how to adjust the sample size.

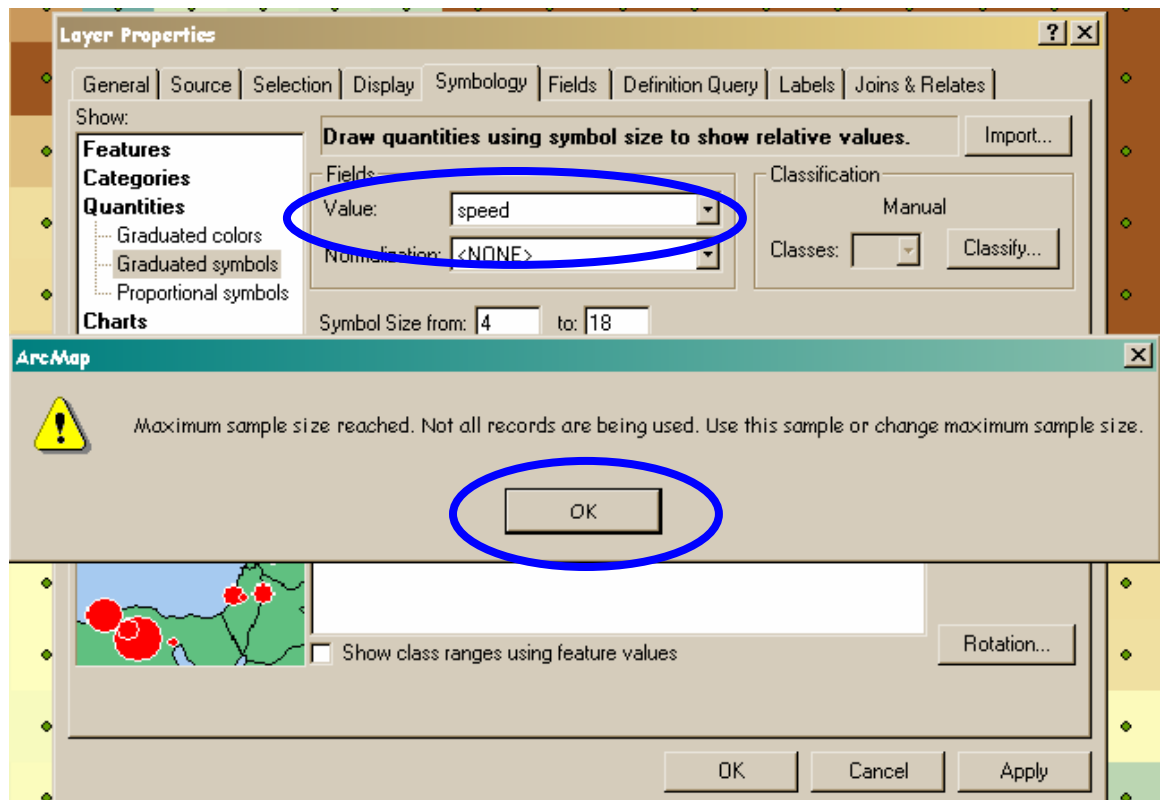


Figure 5. Selecting speed as the value to graduate the symbol and removing the Warning Message box.

7. Selecting the display symbol and changing the **Symbol Size** (Figure 6). Enter a **Symbol Size** range (20 -30). Arrows are not in the default symbol sets, so to select an arrow to display you need to choose one of the symbol sets that have arrows in it. This is done by clicking on the **Template** button (Figure 6).

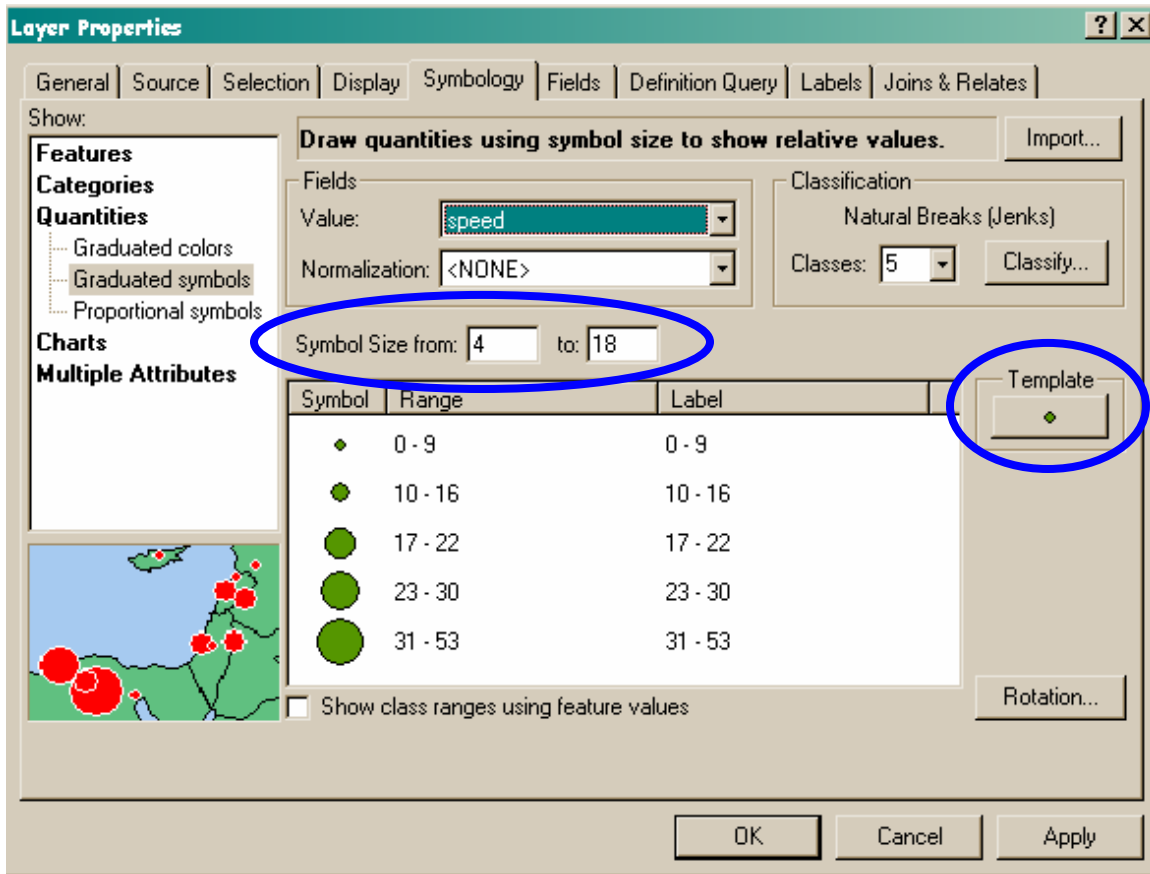
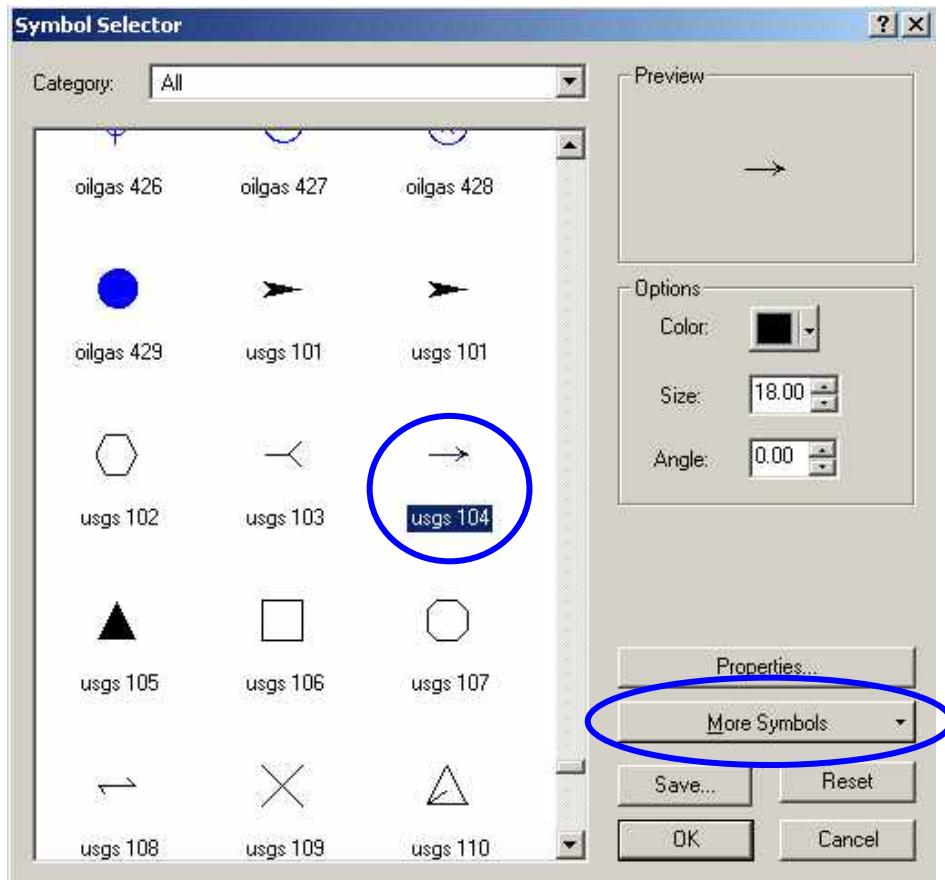


Figure 6. Changing the Symbol Size Range and choosing a new symbol set with arrows.

8. Select a symbol to represent the wind vectors. Under **More Symbols** choose either the **IGL** or **Forestry** symbol sets. The arrows toward the bottom work well in the **IGL** symbol set (Figure 7). In the **Forestry** symbol set there is a wind speed direction arrow for use.



**Figure 7. Selecting an appropriate arrow for display from the IGL symbol set.**

9. Click **OK** to return the **Layer Properties** dialog box.
10. Click on the **Rotation** button, which will open the **Rotation** dialog box (Figure 8). Click on the dropdown arrow and select **AM\_dir** to rotate the points from the available options and select **Geographic** in the radio button for **Rotation Style**.

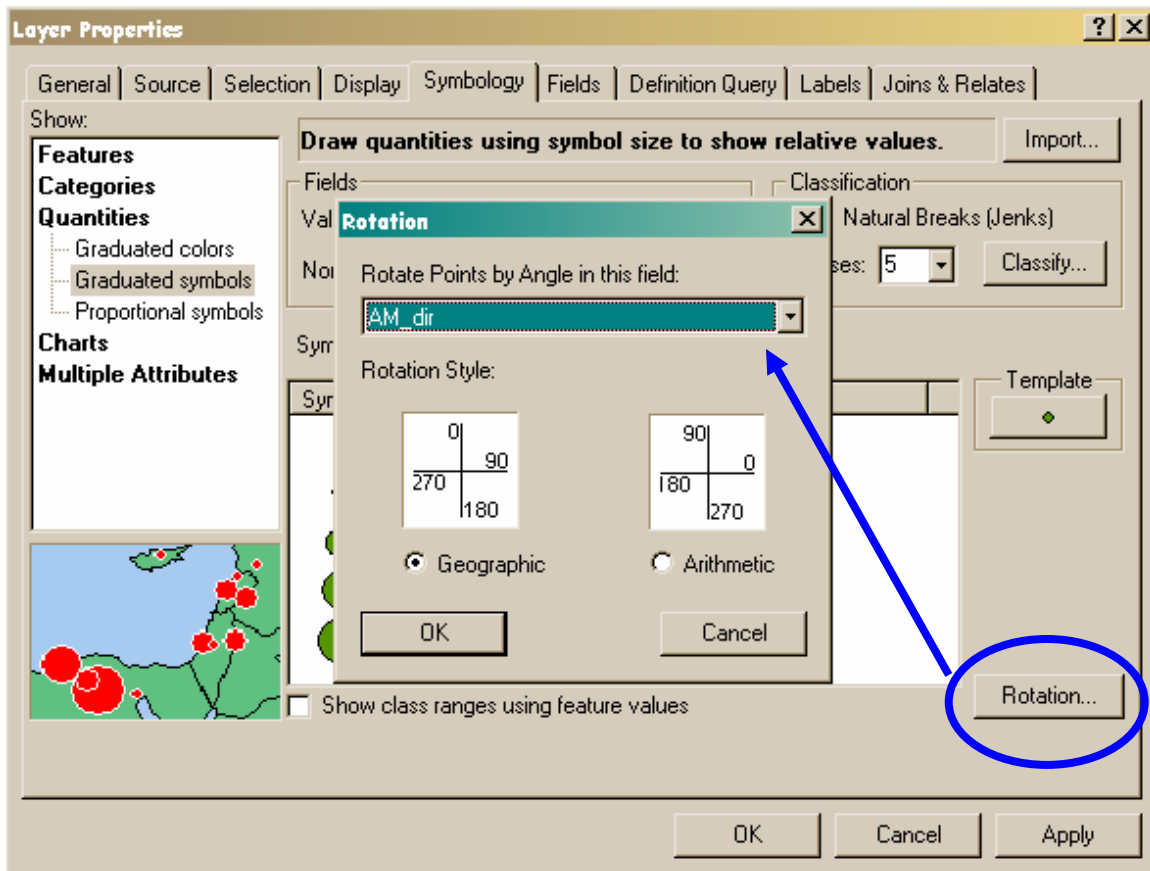
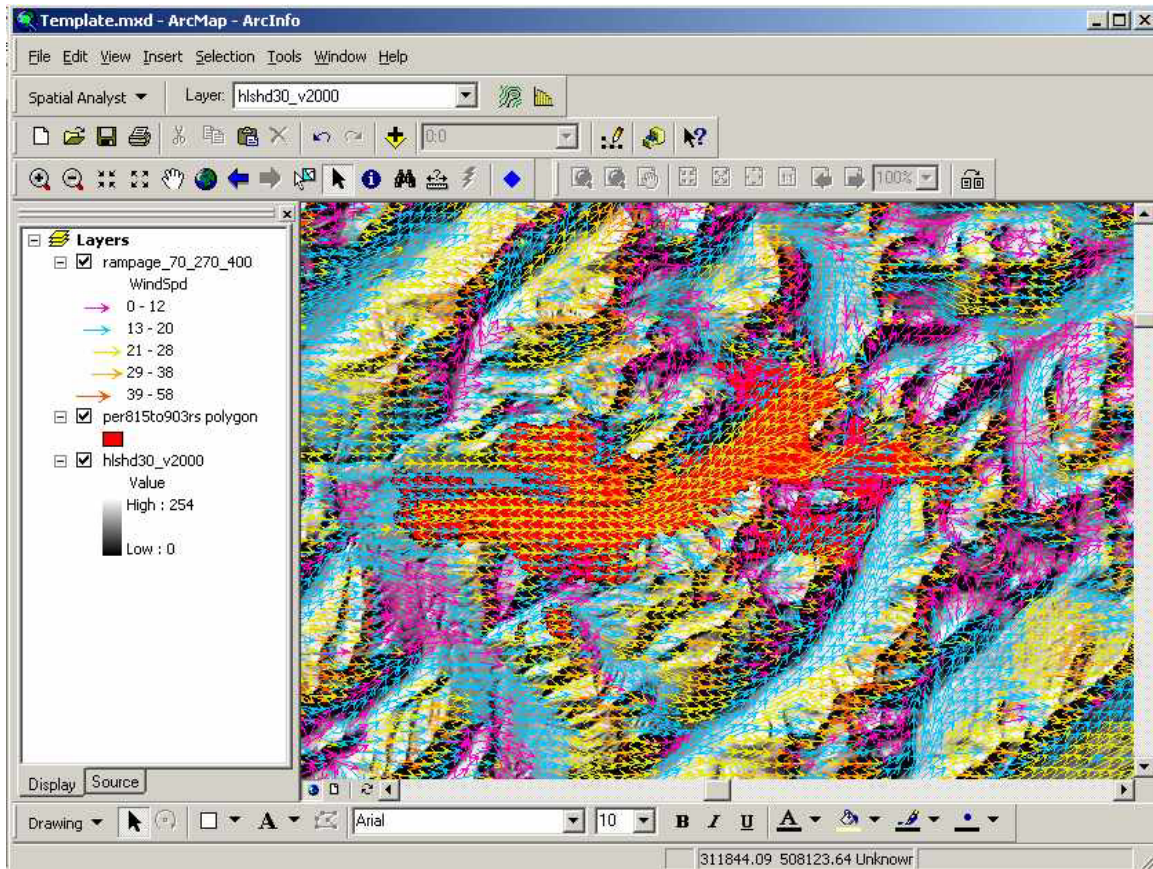


Figure 8. Selecting the data field and Rotation Style for arrow rotation.

11. Click **OK** to close the **Rotation** window and **OK** again to close the **Layer Properties** window.
12. The wind vectors will appear over the existing layers (Figure 9).
13. Symbol colors can be changed by clicking on the individual symbols in the **Table of Contents** for the respective shapefile (Figure 9).





**Figure 9. ArcMap display of rotated and graduated wind direction and speed.**

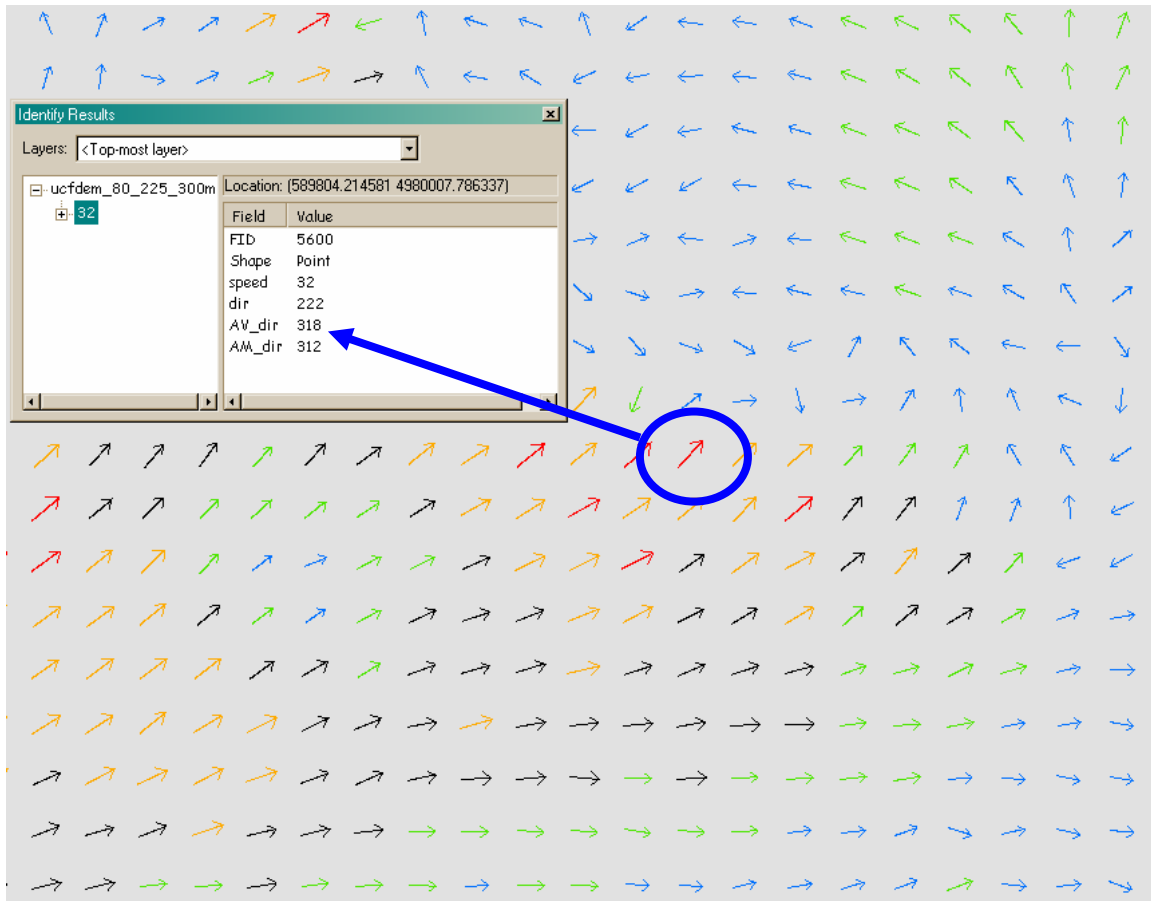
## **B. Query the Gridded Wind Output in ArcMap**

To correctly rotate the arrows in ArcMap as described above requires manipulation of the data generated by the Wind Wizard software for display purposes. The Wind Wizard software does this automatically every time it generates a shapefile. There are 6 data fields included within the .DBF file for each gridded wind shapefile in ArcMap. These are:

1. FID: Feature ID, a unique number assigned to that point by ArcMap.
2. Shape: Point indicates that the feature type for the shapefile is a point.
3. speed: Is the Wind Wizard generated windspeed at the 20-foot level in miles per hour (mph).
4. dir: Is the Wind Wizard generated azimuth direction the wind is coming from in degrees.
5. AV\_dir: Is the Wind Wizard manipulated value required for use in ArcView for display purposes.
6. AM\_dir: Is the Wind Wizard manipulated value required for use in ArcMap for display purposes.

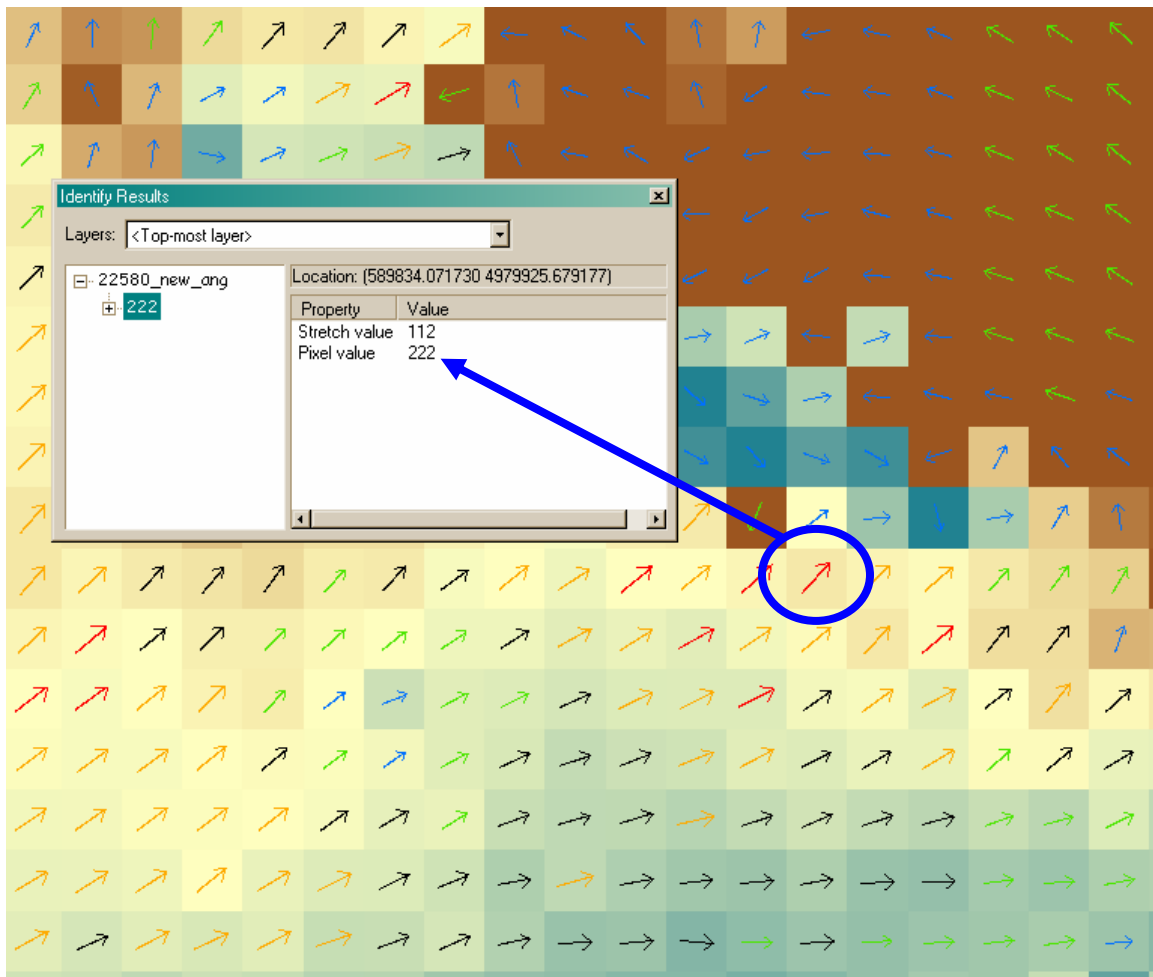


In Figure 10 the query information for the circled arrow shows the wind speed as 32 mph with an AM\_dir of 312. The AM\_dir value for wind direction in the shapefile **IS NOT** the same value as generated by the Wind Wizard software; it is for rotation and display purposes only. For this point the windspeed is 32 mph (speed) and wind is coming from 222 degrees (Dir). The values for speed and dir are the Wind Wizard derived values that should be used in any analysis using this shapefile.



**Figure 10. Query results of gridded wind shapefile in ArcMap showing the difference in the wind direction in the shapefile and the rotation angle of the arrow.**

Figure 11 focuses on the same point on the landscape. However, in this case the ArcMap shapefile is overlaid on the GRID of wind direction generated by the Wind Wizard software. This requires importing the ASCII output file as a GRID using either ARCINFO or the **Import to Raster Conversion Tool** in **ArcToolbox**. A query of the individual raster cell shows a Pixel value of 222 which corresponds to the direction the wind is coming from.



**Figure 11. Query of the gridded wind generated ArcMap shapefile overlaid on the GRID ASCII output from the wind wizard process.**

### **C. A note on querying previously generated Wind Wizard Shapefiles.**

Previous versions of the Wind Wizard software gave the option of selecting the shapefile format the user desired, either in ArcView or ArcMap. This option was given primarily because each ESRI program rotates the arrows differently. In ArcMap shapefiles 4 data fields were included:

1. FID: Feature ID, a unique number assigned to that point by ArcMap.
2. Shape: Point; indicates that the feature type for the shapefile is a point.
3. WindSpd: Is the Wind Wizard generated windspeed at the 20-foot level in miles per hour (mph).
4. WindDir: Is the Wind Wizard manipulated value required for use in ArcView for display purposes.

When querying previously generated shapefiles the WindDir value will not match the rotation angle of the rotated arrow. The only true value in the shapefile is the WindSpd

value. To determine if the arrow is pointing in the correct direction the rotated shapefile needs to be overlayed on the GRID of wind direction as described previously for Figure 11.